What is claimed is:

1. A manufacturing apparatus for a carbon nanotube, comprising:

at least two electrodes whose tips are opposed to each other;

at least a power supply that applies a voltage between the two electrodes to generate discharge plasma in a discharge area between the two electrodes; and

at least a plurality of magnets that generates, in a generation area of the discharge plasma, at least one of a magnetic field of multiple directions and a magnetic field having a component in parallel with a flowing direction of a discharge current,

wherein a thermal shield wall made of a non-magnetic material is disposed between the magnets and the generation area of the discharge plasma.

2. A manufacturing apparatus for a carbon nanotube according to claim 1, wherein the thermal shield wall includes a cooling unit.

3. A manufacturing apparatus for a carbon nanotube according to claim 1, wherein at least the two electrodes and the generation area of the discharge plasma are received in one container.

4. A manufacturing apparatus for a carbon nanotube according to claim 3, wherein a part of the container serves as the thermal shield wall.

5. A manufacturing apparatus for a carbon nanotube according to claim 3, wherein the container is a sealed container.

6. A manufacturing apparatus for a carbon nanotube according to claim 5, further comprising an atmosphere adjusting unit for adjusting at least one of a pressure and a gas type of an atmosphere inside the sealed container.

7. A manufacturing apparatus for a carbon nanotube according to claim 5, wherein the discharge plasma generated in the discharge area is arc plasma.

8. A manufacturing apparatus for a carbon nanotube according to claim 1, wherein the plurality of magnets is selected from the group consisting of permanent magnets and electromagnets arranged along the flowing direction of the discharge current so as to surround at least one of the generation area of the discharge plasma and an area close to the generation area, and wherein each of the plurality of magnets is arranged to direct the same pole toward the discharging area.

9. A manufacturing apparatus for a carbon nanotube according to claim 1, wherein the plurality of magnets includes even number

of magnets, equal to or greater than four, selected from the group consisting of permanent magnets and electromagnets arranged along the flowing direction of the discharge current so as to surround at least one of the generation area of the discharge plasma and an area close to the generation area, and wherein each of the plurality of magnets is arranged to have a pole opposite to that of the adjacent magnet directed toward the discharging area.

10. A manufacturing apparatus for a carbon nanotube according to claim 1, wherein the magnets are formed of one or two coils whose center axis is approximately aligned to the flowing direction of the discharge current.

11. A manufacturing apparatus for a carbon nanotube according to claim 1, wherein, of the two electrodes whose tips are opposed to each other, a magnetic flux density at an edge of the tip of the electrode that generates the discharge plasma is in a range from 10^{-5} T to 1 T.

12. A manufacturing apparatus for a carbon nanotube according to claim 1, wherein a density of the discharge current at the time of generating the discharge plasma is in a range from 0.05 A/mm^2 to 15 A/mm^2 with respect to an area of the tip of the electrode that generates the discharge plasma.

13. A manufacturing apparatus for a carbon nanotube according to claim 1, wherein the voltage applied to the electrodes by the power supply is in a range from 1 V to 30 V.

14. A manufacturing apparatus for a carbon nanotube according to claim 1, wherein the voltage applied to the electrodes by the power supply is a DC voltage.

15. A manufacturing apparatus for a carbon nanotube according to claim 1, wherein the voltage applied to the electrodes by the power supply is a DC voltage, and wherein an area of a tip of a cathode of the two electrodes whose tips are opposed to each other is equal to or less than an area of a tip of an anode of the two electrodes.

16. A manufacturing apparatus for a carbon nanotube according to claim 1, wherein a material of the electrodes is one of carbon and a material that contains carbon and has an electric resistivity in a range from 0.01 Ω·cm to 10 Ω·cm.